PART J-1
WORKING SURFACES, GUARDING FLOORS AND WALL OPENINGS, FIXED LADDERS

Note: Requirements relating to portable ladders have been moved to chapter 296-876 WAC, Portable ladders.

WAC

WAC 296-24-735 Walking-working surfaces.

[Order 73-5, § 296-24-735, filed 5/9/73 and Order 73-4, § 296-24-735, filed 5/7/73.]

WAC 296-24-73501 General requirements. This section applies to all permanent places of employment, except where domestic, mining, or agricultural work only is performed. Construction work isn't to be deemed as a permanent place of employment. Measures for the control of toxic materials are considered to be outside the scope of this section.

[Statutory Authority: RCW 49.17.010, [49.17].050 and [49.17].060. 95-22-015, § 296-24-73501, filed 10/20/95, effective 1/16/96. Statutory Authority: Chapter 49.17 RCW. 94-06-068 (Order 93-17), § 296-24-73501, filed 3/2/94, effective 3/1/95; Order 73-5, § 296-24-73501, filed 5/9/73 and Order 73-4, § 296-24-73501, filed 5/7/73.]

WAC 296-24-73505 Aisles and passageways.

(1) Where mechanical handling equipment is used, sufficient safe clearances shall be allowed for aisles, at loading docks, through doorways and wherever turns or passage must be made. Aisles and passageways shall be kept clear and in good repairs, with no obstruction across or in aisles that could create a hazard.

(2) Permanent aisles and passageways shall be appropriately marked. Appropriate doesn't limit the marking to printed lines on the floor only. Other appropriate methods may be marked pillars, powder stripping, flags, traffic cones, or barrels, provided they are maintained in good repair and the recognition of such markings are included in the training programs for vehicle operators and employees.

(3) All trestles in connection with industrial plants on which cars run, which are also used as walkways for workers, shall be equipped with a walkway on the outer edge, so located as to give safe minimum clearance of 3 feet to cars. Such walkways shall be equipped with standard rails. Where a trestle crosses a driveway or passageway the trestle over such points shall be solidly boarded over.

[Statutory Authority: Chapter 49.17 RCW. 94-15-096 (Order 94-07), § 296-24-73505, filed 7/20/94, effective 9/20/94; 89-11-035 (Order 89-03), § 296-24-73505, filed 5/15/89, effective 6/30/89; Order 73-5, § 296-24-73505, filed 5/9/73 and Order 73-4, § 296-24-73505, filed 5/7/73.]

WAC 296-24-73507 Covers and guardrails.

(1) All open vats and tanks into which workers may fall shall be guarded with railings or screen guards.

(2) All open vats and tanks where workers are employed shall have a platform or walkway 36 to 42 inches below the top of vat or tank or where walkway is flush with top of vat or tank, a standard safeguard of 36 to 42 inches high shall be constructed.

(3) Every tank over 5 feet deep, excepting where agitators are used or where products may be damaged by ladders, shall have a ladder fixed on the inside so placed as to connect with means of access from the outside. Rungs shall have a clearance of at least 6 inches measured between the rung and the side of the tank.

[Statutory Authority: RCW 49.17.040, 49.17.150, and 49.17.240. 79-08-115 (Order 79-9), § 296-24-73507, filed 7/31/79; Order 74-27, § 296-24-73507, filed 5/7/74; Order 73-5, § 296-24-73507, filed 5/9/73 and Order 73-4, § 296-24-73507, filed 5/7/73.]

WAC 296-24-73511 Steam pipes.

(1) All steam pipes or pipes heated by any other means to a sufficient temperature to burn a person (other than coil pipes, radiators, for heating rooms or buildings, or pipes on portable steam engines and boilers) and which are within 7 feet of a floor or platform, if exposed to contact, shall be guarded with a standard safeguard.

WAC 296-24-73511 (Cont.)

(2) Protection from hot pipes. All exposed hot pipes within 7 feet of the floor or working platform, or within 15 inches measured horizontally from stairways, ramps or fixed ladders, shall be covered with an insulating material or be guarded in such a manner as to prevent contact.

[Order 74-27, § 296-24-73511, filed 5/7/74.]

WAC 296-24-750 Guarding floor and wall openings and holes.

[Order 73-5, § 296-24-750, filed 5/9/73 and Order 73-4, § 296-24-750, filed 5/7/73.]

WAC 296-24-75001 Terms. The following terms shall have the meaning ascribed in this section, when referred to in WAC 296-24-75003 through 296-24-75011, unless the context requires otherwise.

(1) **Floor hole.** An opening measuring less than 12 inches but more than 1 inch in its least dimension, in any floor, platform, pavement, or yard, through which materials but not persons may fall; such as a belt hole, pipe opening, or slot opening.

(2) **Floor opening.** An opening measuring 12 inches or more in its least dimension, in any floor, platform, pavement, or yard, through which persons may fall; such as a hatchway, stair or ladder opening, pit, or large manhole. Floor openings occupied by elevators, dumb waiters, conveyors, machinery, or containers are excluded from this part.

(3) **Handrail.** A single bar or pipe supported on brackets from a wall or partition, as on a stairway or ramp, to furnish persons with a handhold in case of tripping.

(4) **Platform.** A working space for persons, elevated above the surrounding floor or ground; such as a balcony or platform for the operation of machinery and equipment.

(5) **Runway.** A passageway for persons, elevated above the surrounding floor or ground level, such as a footwalk along shafting or a walkway between buildings.

(6) **Standard railing.** A vertical barrier erected along exposed edges of a floor opening, wall opening, ramp, platform, or runway to prevent falls of person.

(7) **Standard strength and construction.** Any construction of railings, covers, or other guards that meets the requirements of WAC 296-24-750 through 296-24-75011.

(8) **Stair railing.** A vertical barrier erected along exposed sides of a stairway to prevent falls of persons.

(9) **Toeboard.** A vertical barrier at floor level erected along exposed edges of a floor opening, wall opening, platform, runway, or ramp to prevent falls of materials.

(10) **Wall hole.** An opening less than 30 inches but more than 1 inch high, of unrestricted width, in any wall or partition; such as a ventilation hole or drainage scupper.

(11) **Wall opening.** An opening at least 30 inches high and 18 inches wide, in any wall or partition, through which persons may fall; such as a yard-arm doorway or chute opening.

[Statutory Authority: Chapter 49.17 RCW. 94-15-096 (Order 94-07), § 296-24-75001, filed 7/20/94, effective 9/20/94; Order 73-5, § 296-24-75001, filed 5/9/73 and Order 73-4, § 296-24-75001, filed 5/7/73.]

WAC 296-24-75003 Protection for floor openings.

(1) Every ladderway floor opening or platform shall be guarded by a standard railing with standard toeboard on all exposed sides (except at entrance to opening), with the passage through the railing either provided with a swinging gate or so offset that a person can't walk directly into the opening.

(2) Every hatchway and chute floor opening shall be guarded by one of the following:

(a) Hinged floor opening cover of standard strength and construction equipped with standard railings or permanently attached thereto so as to leave only one exposed side. When the opening isn't in use, the cover shall be closed or the exposed side shall be guarded at both top and intermediate positions by removable standard railings.

(b) A removable railing with toeboard on not more than 2 sides of the opening and fixed standard railings with toeboards on all other exposed sides. The removable railings shall be kept in place when the opening isn't in use and should preferably be hinged or otherwise mounted so as to be conveniently replaceable.

Where operating conditions necessitate the feeding of material into any hatchway or chute opening, protection shall be provided to prevent a person from falling through the opening.

(c) The area under floor openings shall, where practical, be fenced off. When this isn't practical, the areas shall be plainly marked with yellow lines and telltales shall be installed to hang within 5 and one-half feet of ground or floor level.

(d) Where floor openings are used to drop materials from one level to another, audible warning systems shall be installed and used to indicate to employees on the lower level that material is to be dropped.

(3) Every skylight opening and hole shall be guarded by a standard skylight screen or a fixed standard railing on all exposed sides.

(4) Every pit and trapdoor floor opening, infrequently used, shall be guarded by a floor opening cover of standard strength and construction which should be hinged in place. While the cover isn't in place, the pit or trap opening shall be constantly attended by someone or shall be protected on all exposed sides by removable standard railings.

(5) Every manhole floor opening shall be guarded by a standard manhole cover which need not be hinged in place. While the cover isn't in place, the manhole opening shall be constantly attended by someone or shall be protected by removable standard railings.

[Order 74-27, § 296-24-75003, filed 5/7/74; Order 73-5, § 296-24-75003, filed 5/9/73 and Order 73-4, § 296-24-75003, filed 5/7/73.]

WAC 296-24-75005 Protection for wall openings and holes.

(1) Every wall opening from which there is a drop of more than 4 feet shall be guarded by one of the following:

(a) Rail, roller, picket fence, half door, or equivalent barrier.

The guard may be removable but should preferably be hinged or otherwise mounted so as to be conveniently replaceable. Where there is exposure below to falling materials, a removable toeboard or the equivalent shall also be provided. When the opening isn't in use for handling materials, the guard shall be kept in position regardless of a door on the opening. In addition, a grab handle shall be provided on each side of the opening with its center approximately 4 feet above floor level and of standard strength and mounting.

WAC 296-24-75005 (Cont.)

(b) Extension platform onto which materials can be hoisted for handling, and which shall have side rails or equivalent guards of standard specifications.

(2) Every chute wall opening from which there is a drop of more than 4 feet shall be guarded by one or more of the barriers specified in WAC 296-24-75005 (1)(a) and (b), or as required by the conditions.

(3) Every window wall opening at a stairway landing, floor, platform, or balcony, from which there is a drop of more than 4 feet, and where the bottom of the opening is less than 3 feet above the platform or landing, shall be guarded by standard slats, standard grill work (as specified in WAC 296-24-75011(11)), or standard railing.

Where the window opening is below the landing, or platform, a standard toeboard shall be provided.

(4) Every temporary wall opening shall have adequate guards but these need not be of standard construction.

(5) Where there is a hazard of materials falling through a wall hole, and the lower edge of the near side of the hole is less than 4 inches above the floor, and the far side of the hole more than 5 feet above the next lower level, the hole shall be protected by a standard toeboard, or an enclosing screen either of sold construction, or as specified in WAC 296-24-75011(11).

[Order 73-5, § 296-24-75005, filed 5/9/73 and Order 73-4, § 296-24-75005, filed 5/7/73.]

WAC 296-24-75007 Protection of open-sided runways.

(1) Railings must be provided with a toeboard wherever, beneath the open sides,

(a) Persons can pass,

(b) There is moving machinery, or

(c) There is equipment with which falling materials could create a hazard.

(2) Every runway shall be guarded by a standard railing (or the equivalent as specified in WAC 296-24-75011(3) on all open sides 4 feet or more above floor or ground level. Wherever tools, machine parts, or materials are likely to be used on the runway, a toeboard shall also be provided on each exposed side.

Runways used exclusively for special purposes (such as oiling, shafting, or filling tank cars) may have the railing on one side omitted where operating conditions necessitate such omission, providing the falling hazard is minimized by using a runway of not less than 18 inches wide. Where persons entering upon runways become thereby exposed to machinery, electrical equipment, or other danger not a falling hazard, additional guarding than is here specified may be essential for protection.

(3) Regardless of height, runways above or adjacent to dangerous equipment, pickling or galvanizing tanks, degreasing units, and similar hazards shall be guarded with a standard railing and toeboard.

[Order 76-6, § 296-24-75007, filed 3/1/76; Order 73-5, § 296-24-75007, filed 5/9/73 and Order 73-4, § 296-24-75007, filed 5/7/73.]

WAC 296-24-75011 Railing, toeboards, and cover specifications.

(1) A standard railing shall consist of top rail, intermediate rail, and posts, and shall have a vertical height of 42 inches, plus or minus 3 inches, from upper surface of top rail to floor, platform, runway, or ramp level and:

(a) The top rail shall be smooth-surfaced throughout the length of the railing.

WAC 296-24-75011 (Cont.)

(b) The intermediate rail shall be approximately halfway between the top rail and the floor, platform, runway, or ramp.

(c) The ends of the rails shall not overhang the terminal posts except where such overhang doesn't constitute a projection hazard.

(d) Guardrails with heights greater than 42 inches are permissible provided the extra height doesn't create a dangerous situation for employees and that additional mid-rails were installed so that openings beneath the top rail wouldn't permit the passage of a 19-inch or larger spherical object.

(2) A stair railing shall be of construction similar to a standard railing but the vertical height shall be not more than 34 inches nor less than 30 inches from upper surface of top rail to surface of tread in line with face of riser at forward edge of tread.

(3) Minimum requirements for standard railings under various types of construction are specified in this subsection. Dimensions specified are based on the U.S. Department of Agriculture Wood Handbook, No. 72, 1955 (No. 1 (S4S) Southern Yellow Pine (Modulus of Rupture 7,400 p.s.i.)) for wood; ANSI G 41.5-1970, American National Standard Specifications for Structural Steel, for structural steel; and ANSI B 125.1-1970, American National Standard Specifications for Welded and Steamless Steel Pipe, for pipe.

(a) For wood railings, the posts shall be of at least 2-inch by 4-inch nominal stock spaced not to exceed 6 feet; the top and intermediate rails shall be of at least 2-inch by 4-inch nominal stock. If top rail is made of 2 right-angle pieces of one-inch by 4-inch stock, posts may be spaced on 8-foot centers, with 2-inch by 4-inch intermediate rail.

(b) For pipe railings, posts and top and intermediate railings shall be at least one and one-half inches nominal diameter (outside diameter) with posts spaced not more than 8t feet on centers.

(c) For structural steel railings, posts and top and intermediate rails shall be of 2-inch by 2-inch by three-eighths-inch angles or other metal shapes of equivalent bending strength with posts spaced not more than 8 feet on centers.

(d) The anchoring of posts and framing of members for railings of all types shall be of such construction that the completed structure shall be capable of withstanding a load of at least 200 pounds applied in any direction at any point on the top rail.

(e) Other types, sizes, and arrangements of railing construction are acceptable provided they meet the following conditions:

(i) A smooth-surfaced top rail at a height above floor, platform, runway, or ramp level of from 36 to 42 inches nominal;

(ii) A strength to withstand at least the minimum requirement of 200 pounds top rail pressure;

(iii) Protection between top rail and floor, platform, runway, ramp, or stair treads, equivalent at least to that afforded by a standard intermediate rail;

(iv) Elimination of overhang of rail ends unless such overhang doesn't constitute a hazard; such as, baluster railings, scrollwork railings, paneled railings.

WAC 296-24-75011 (Cont.)

(4) A standard toeboard shall be a minimum of 4 inches nominal in vertical height from its top edge to the level of the floor, platform, runway, or ramp. It shall be securely fastened in place and with not more than one-quarter-inch clearance above floor level. It may be made of any substantial material either solid or with openings not over one inch in greatest dimension.

Where material is piled to such height that a standard toeboard doesn't provide protection, paneling from floor to intermediate rail, or to top rail shall be provided.

(5) A handrail shall consist of a lengthwise member mounted directly on a wall or partition by means of brackets attached to the lower side of the handrail so as to offer no obstruction to a smooth surface along the top and both sides of the handrail. The handrail shall be of rounded or other section that will furnish an adequate handhold for anyone grasping it to avoid falling. The ends of the handrail should be turned in to the supporting wall or otherwise arranged so as not to constitute a projection hazard.

(a) The height of handrails shall be not more than 34 inches nor less than 30 inches from upper surface of handrail to surface of tread in line with face of riser or to surface of ramp.

(b) The size of handrails shall be: When of hardwood, at least 2 inches in diameter; when of metal pipe, at least one and one-half inches in diameter. The length of brackets shall be such as will give a clearance between handrail and wall or any projection thereon of at least one and one-half inches. The spacing of brackets shall not exceed 8 feet.

(c) The mounting of handrails shall be such that the completed structure is capable of withstanding a load of at least 200 pounds applied in any direction at any point on the rail.

(6) All handrails and railings shall be provided with a clearance of not less than one and one-half inches between the handrail or railing and any other object.

(7) Floor opening covers may be of any material that meets the following strength requirements:

(a) Trench or conduit covers and their supports, when located in plant roadways, shall be designed to carry a truck rear-axle load of at least 20 thousand pounds.

(b) Manhole covers and their supports, when located in plant roadways, shall comply with local standard highway requirements if any; otherwise, they shall be designed to carry a truck rear-axle of at least 20 thousand pounds.

(c) The construction of floor opening covers may be of any material that meets the strength requirements. Covers projecting not more than one inch above the floor level may be used providing all edges are chamfered to an angle with the horizontal of not over 30 degrees. All hinges, handles, bolts, or other parts shall set flush with the floor or cover surface.

(8) Skylight screens shall be of such construction and mounting that they are capable of withstanding a load of at least 200 pounds applied perpendicularly at any one area on the screen. They shall also be of such construction and mounting that under ordinary loads or impacts, they won't deflect downward sufficiently to break the glass below them. The construction shall be of grillwork with openings not more than 4 inches long or of slatwork with openings not more than 2 inches wide with length unrestricted.

(9) Wall opening barriers (rails, rollers, picket fences, and half doors) shall be of such construction and mounting that, when in place at the opening, the barrier is capable of withstanding a load of at least 200 pounds applied in any direction (except upward) at any point on the top rail or corresponding member.

WAC 296-24-75011 (Cont.)

(10) Wall opening grab handles shall be not less than 12 inches in length and shall be so mounted as to give one and one-half inches clearance from the side framing of the wall opening. The size, material, and anchoring of the grab handle shall be such that the completed structure is capable of withstanding a load of at least 200 pounds applied in any direction at any point of the handle.

(11) Wall opening screens shall be of such construction and mounting that they are capable of withstanding a load of at least 200 pounds applied horizontally at any point on the near side of the screen. They may be of solid construction, of grillwork with openings not more than 8 inches long, or of slatwork with openings not more than 4 inches wide with length unrestricted.

[Statutory Authority: RCW 49.17.010, .040, .050, and .060. 04-07-161 (Order 03-35), § 296-24-75011, filed 03/23/04, effective 05/01/04. Statutory Authority: Chapter 49.17 RCW. 91-03-044 (Order 90-18), § 296-24-75011, filed 1/10/91, effective 2/12/91; 89-11-035 (Order 89-03), § 296-24-75011, filed 5/15/89, effective 6/30/89. Statutory Authority: RCW 49.17.040, 49.17.150, and 49.17.240. 79-08-115 (Order 79-9), § 296-24-75011, filed 7/31/79; Order 73-5, § 296-24-75011, filed 5/9/73 and Order 73-4, § 296-24-75011, filed 5/7/73.]

WAC 296-24-765 Fixed industrial stairs.

[Order 73-5, § 296-24-765, filed 5/9/73 and Order 73-4, § 296-24-765, filed 5/7/73.]

WAC 296-24-76501 Terms. The following terms shall have the meaning ascribed in this section when referred to in WAC 296-24-76503 through 296-24-76523 unless the context requires otherwise.

(1) **Handrail.** A single bar or pipe supported on brackets from a wall or partition to provide a continuous handhold for persons using a stair.

(2) **Nose, nosing.** That portion of a tread projecting beyond the face of the riser immediately below.

(3) **Open riser.** The air space between the treads of stairways without upright members (risers).

(4) **Platform.** An extended step or landing breaking a continuous run of stairs.

(5) **Railing.** A vertical barrier erected along exposed sides of stairways and platforms to prevent falls of persons. The top member of railing usually serves as a handrail.

(6) **Rise.** The vertical distance from the top of a tread to the top of the next higher tread.

(7) **Riser.** The upright member of a step situated at the back of a lower tread and near the leading edge of the next higher tread.

(8) **Stairs, stairway.** A series of steps leading from one level or floor to another, or leading to platforms, pits, boiler rooms, crossovers, or around machinery, tanks, and other equipment that are used more or less continuously or routinely by employees, or only occasionally by specific individuals. A series of steps and landings having 3 or more risers constitutes stairs or stairway.

(9) **Tread.** The horizontal member of a step.

(10) **Tread run.** The horizontal distance from the leading edge of a tread to the leading edge of an adjacent tread.

(11) **Tread width.** The horizontal distance from front to back of tread including nosing when used.

[Order 73-5, § 296-24-76501, filed 5/9/73 and Order 73-4, § 296-24-76501, filed 5/7/73.]

WAC 296-24-76503 Application of requirements. This section contains specifications for the safe design and construction of fixed general industrial stairs. This classification includes interior and exterior stairs around machinery, tanks, and other equipment, and stairs leading to or from floors, platforms, or pits. This section doesn't apply to stairs used for fire exit purposes, to construction operations, to private buildings or residences, or to articulated stairs, such as may be installed on floating roof tanks or on dock facilities, the angle of which changes with the rise and fall of the base support.

When stairs of public and private buildings are located at loading or receiving docks, in maintenance areas, etc., or are used exclusively by employees, the term "fixed industrial steps" will apply and be evaluated accordingly.
[Statutory Authority: Chapter 49.17 RCW. 90-03-029 (Order 89-20), § 296-24-76503, filed 1/11/90, effective 2/26/90; Order 73-5, § 296-24-76503, filed 5/9/73 and Order 73-4, § 296-24-76503, filed 5/7/73.]

WAC 296-24-76507 Stair strength. Fixed stairways shall be designed and constructed to carry a load of 5 times the normal live load anticipated but never of less strength than to carry safely a moving concentrated load of 1,000 pounds.
[Order 73-5, § 296-24-76507, filed 5/9/73 and Order 73-4, § 296-24-76507, filed 5/7/73.]

WAC 296-24-76509 Stair width. Fixed stairways shall have a minimum width of 22 inches.
[Order 73-5, § 296-24-76509, filed 5/9/73 and Order 73-4, § 296-24-76509, filed 5/7/73.]

WAC 296-24-76511 Angle of stairway rise.

(1) Fixed stairs shall be installed at angles to the horizontal of between 30 degrees and 50 degrees. Any uniform combination of rise/tread dimensions may be used that will result in a stairway at any angle to the horizontal within the permissible range. Table D-1 gives rise/tread dimensions which will produce a stairway within the permissible range, stating the angle to the horizontal produced by each combination. However, the rise/tread combinations aren't limited to those given in Table D-1.

(2) Because of space limitations a permanent stairway sometimes has to be installed at an angle above the 50 degree critical angle. Such installations are commonly called inclined ladders or ship's ladders, which shall have handrails on both sides and open risers. They shall be capable of sustaining a live load of 100 pounds per square foot with a safety factor of 4. The following preferred and critical angles from the horizontal shall be considered for inclined ladders and ship's ladders:

(a) 35 to 60 degrees - Preferred angle from horizontal.

(b) 60 to 70 degrees - Critical angle from horizontal.

[Statutory Authority: Chapter 49.17 RCW. 89-11-035 (Order 89-03), § 296-24-76511, filed 5/15/89, effective 6/30/89; Order 73-5, § 296-24-76511, filed 5/9/73 and Order 73-4, § 296-24-76511, filed 5/7/73.]

WAC 296-24-76513 Stair treads. Each tread and the top landing of a stairway, where risers are used, should have a nose which extends one-half inch to 1 inch beyond the face of the lower riser. Noses should have an even leading edge. All treads shall be reasonably slip-resistant and the nosings shall be of nonslip finish. Welded bar grating treads without nosings are acceptable providing the leading edge can be readily identified by personnel descending the stairway and provided the tread is serrated or is of definite nonslip design. Rise height and tread width shall be uniform throughout any flight of stairs including any foundation structure used as one or more treads of the stairs.

WAC 296-24-76513 (Cont.)

TABLE D-1		
Angle to horizontal	**Rise (in inches)**	**Tread run (in inches)**
30°35'	6 ½	11
32°08'	6 ¾	10 ¾
33°41'	7	10 ½
35°16'	7 ¼	10 ¼
36°52'	7 ½	10
38°29'	7 ¾	9 ¾
40°08'	8	9 ½
41°44'	8 ¼	9 ¼
43°22'	8 ½	9
45°00'	8 ¾	8 ¾
46°38'	9	8 ½
48°16'	9 ¼	8 ¼
49°54'	9 ½	8

[Order 73-5, § 296-24-76513, filed 5/9/73 and Order 73-4, § 296-24-76513, filed 5/7/73.]

WAC 296-24-76515 Length of stairways. Long flights of stairs, unbroken by landings or intermediate platforms, should be avoided. Consideration should be given to providing intermediate platforms where practical and where such stairways are in frequent use. Stairway platforms shall be no less than the width of a stairway and a minimum of 30 inches in length measured in the direction of travel.
[Order 73-5, § 296-24-76515, filed 5/9/73 and Order 73-4, § 296-24-76515, filed 5/7/73.]

WAC 296-24-76519 Vertical clearance. Vertical clearance above any stair tread to an overhead obstruction shall be at least 7 feet measured from the leading edge of the tread.
[Order 73-5, § 296-24-76519, filed 5/9/73 and Order 73-4, § 296-24-76519, filed 5/7/73.]

WAC 296-24-76521 Open risers. Stairs having treads of less than 9-inch width should have open risers.
[Order 73-5, § 296-24-76521, filed 5/9/73 and Order 73-4, § 296-24-76521, filed 5/7/73.]

WAC 296-24-76523 General. Open grating type treads are desirable for outside stairs.
[Order 73-5, § 296-24-76523, filed 5/9/73 and Order 73-4, § 296-24-76523, filed 5/7/73.]

WAC 296-24-76555 Alternating tread-type stairs. Alternating tread-type stairs have a series of steps between 50 and 70 degrees from horizontal, attached to a center support rail in an alternating manner so that a user of the stairs never has both feet at the same level at the same time. (See Figure D-12.)

(1) Alternating tread-type stairs shall be designed, installed, used, and maintained in accordance with approved manufacturer's specifications, and shall have the following:

(a) Stair rails on all open sides;

(b) Handrails on both sides of enclosed stairs;

(c) Stair rails and handrails of such configuration as to provide an adequate handhold for a user grasping it to avoid a fall;

WAC 296-24-76555 (Cont.)

(d) A minimum of 17 inches between handrails;

(e) A minimum width of 22 inches overall;

(f) A minimum tread depth of 8 inches;

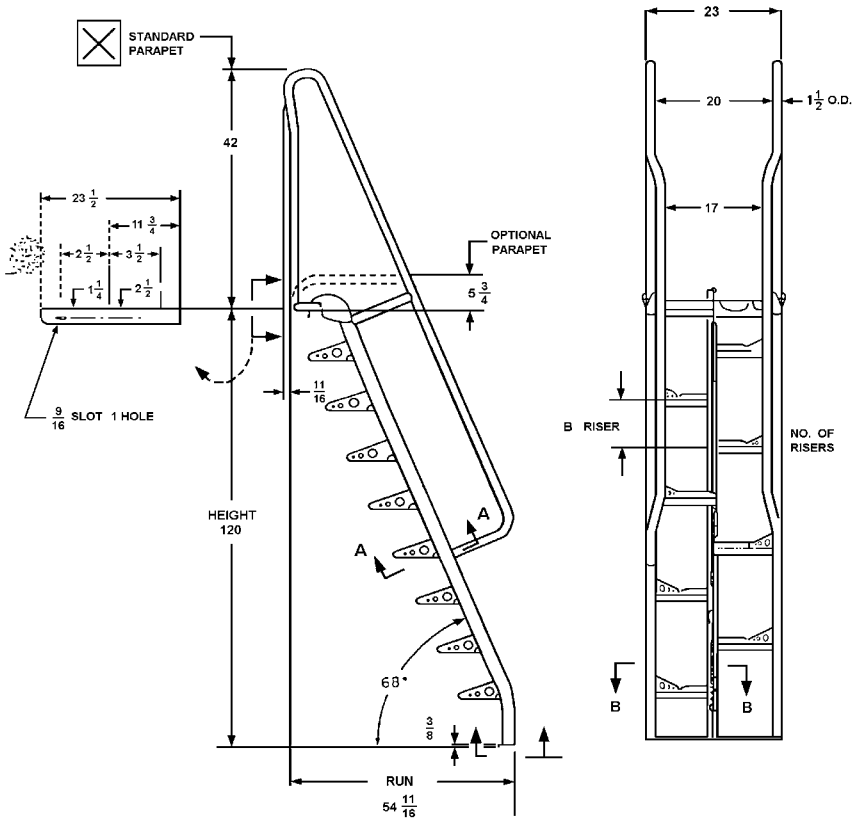
(g) A minimum tread width of 7 inches; and

(h) A maximum rise of 9 1/2 inches to the tread surface of the next alternating tread.

(2) Alternating tread-type stairs shall not have more than a 20-foot continuous rise. Where more than a 20-foot rise is necessary to reach the top of a required stair, one or more intermediate platforms shall be provided in accordance with WAC 296-24-76515.

(3) Stairs and platforms shall be installed so the top landing of the alternating tread stair is flush with the top of the landing platform.

(4) Stair design and construction shall sustain a load of not less than 5 times the normal live load, but never less strength than to carry safely a moving concentrated load of 1,000 pounds.



(5) Treads shall be equipped with slip-resistant surfaces.

(6) Where a platform or landing is used, the width shall not be less than the width of the stair nor less than 30-inch depth in the direction of travel. Stairs shall be flush with the top of the landing platform.

[Statutory Authority: Chapter 49.17 RCW. 92-17-022 (Order 92-06), § 296-24-76555, filed 8/10/92, effective 9/10/92; 91-03-044 (Order 90-18), § 296-24-76555, filed 1/10/91, effective 2/12/91.]

WAC 296-24-810 Fixed ladders.

[Order 73-5, § 296-24-810, filed 5/9/73 and Order 73-4, § 296-24-810, filed 5/7/73.]

WAC 296-24-81001 Definitions. The following terms shall have the meaning ascribed in this section when referred to in WAC 296-24-81003 through 296-24-81007 unless the context requires otherwise.

(1) **Ladder.** A ladder is an appliance usually consisting of 2 side rails joined at regular intervals by crosspieces called steps, rungs, or cleats, on which a person may step in ascending or descending.

(2) **Fixed ladder.** A fixed ladder is a ladder permanently attached to a structure, building, or equipment.

(3) **Individual-rung ladder.** An individual-rung ladder is a fixed ladder each rung of which is individually attached to a structure, building, or equipment.

(4) **Rail ladder.** A rail ladder is a fixed ladder consisting of side rails joined at regular intervals by rungs or cleats and fastened in full length or in sections to a building, structure, or equipment.

(5) **Railings.** A railing is any one or a combination of those railings constructed in accordance with WAC 296-24-75003 through 296-24-75011. A standard railing is a vertical barrier erected along exposed edges of floor openings, wall openings, ramps, platforms, and runways to prevent falls of persons.

(6) **Pitch.** Pitch is the included angle between the horizontal and the ladder, measured on the opposite side of the ladder from the climbing side.

(7) **Fastenings.** A fastening is a device to attach a ladder to a structure, building, or equipment.

(8) **Rungs.** Rungs are ladder crosspieces of circular or oval cross-section on which a person may step in ascending or descending.

(9) **Cleats.** Cleats are ladder crosspieces of rectangular cross-section placed on edge on which a person may step in ascending or descending.

(10) **Steps.** Steps are the flat crosspieces of a ladder on which a person may step in ascending or descending.

(11) **Cage.** A cage is a guard that may be referred to as a cage or basket guard which is an enclosure that is fastened to the side rails of the fixed ladder or to the structure to encircle the climbing space of the ladder for the safety of the person who must climb the ladder.

(12) **Well.** A well is a permanent complete enclosure around a fixed ladder, which is attached to the walls of the well. Proper clearances for a well will give the person who must climb the ladder the same protection as a cage.

(13) **Ladder safety device**. A ladder safety device is any device, other than a cage or well, designed to eliminate or reduce the possibility of accidental falls and which may incorporate such features as life belts, friction brakes, and sliding attachments.

(14) **Grab bars.** Grab bars are individual handholds placed adjacent to or as an extension above ladders for the purpose of providing access beyond the limits of the ladder.

(15) **Through ladder.** A through ladder is one from which a person getting off at the top must step through the ladder in order to reach the landing.

(16) **Side-step ladder.** A side-step ladder is one from which a person getting off at the top must step sideways from the ladder in order to reach the landing.

[Statutory Authority: Chapter 49.17 RCW. 94-15-096 (Order 94-07), § 296-24-81001, filed 7/20/94, effective 9/20/94; Order 73-5, § 296-24-81001, filed 5/9/73 and Order 73-4, § 296-24-81001, filed 5/7/73.]

WAC 296-24-81003 Design requirements.

(1) Design considerations. All ladders, appurtenances, and fastenings shall be designed to meet the following load requirements:

(a) The minimum design live load shall be a single concentrated load of 200 pounds.

(b) The number and position of additional concentrated live-load units of 200 pounds each as determined from anticipated usage of the ladder shall be considered in the design.

(c) The live loads imposed by persons occupying the ladder shall be considered to be concentrated at such points as will cause the maximum stress in the structural member being considered.

(d) The weight of the ladder and attached appurtenances together with the live load shall be considered in the design of rails and fastenings.

(2) Design stresses.

(a) Design stresses for wood components of ladders shall not exceed those specified in WAC 296-24-78001 through 296-24-79507. All wood parts of fixed ladders shall meet the requirements of WAC 296-24-78005.

(b) For fixed ladders consisting of wood side rails and wood rungs or cleats, used at a pitch in the range 75 degrees to 90 degrees, and intended for use by no more than one person per section, single ladders as described in WAC 296-24-78007 (3)(b) are acceptable.

(3) Fixed embedded steps. Individual fixed steps used for access or egress, embedded in the walls of risers or the conical top sections of manholes shall be safe, well constructed, and installed in accordance with good engineering practices. Appurtenances penetrating the manhole walls are prohibited.

[Statutory Authority: Chapter 49.17 RCW. 90-03-029 (Order 89-20), § 296-24-81003, filed 1/11/90, effective 2/26/90; Order 73-5, § 296-24-81003, filed 5/9/73 and Order 73-4, § 296-24-81003, filed 5/7/73.]

WAC 296-24-81005 Specific features.

(1) Rungs and cleats.

(a) All rungs shall have a minimum diameter of three-fourths inch for metal ladders, except as covered in subsection (7)(a) of this section, and a minimum diameter of 1 1/8 inches for wood ladders.

(b) The distance between rungs, cleats, and steps shall not exceed 12 inches and shall be uniform throughout the length of the ladder.

(c) The minimum clear length of rungs or cleats shall be 16 inches.

(d) Rungs, cleats, and steps shall be free of splinters, sharp edges, burrs, or projections which may be a hazard.

(e) The rungs of an individual-rung ladder shall be so designed that the foot can’t slide off the end (A suggested design is shown in Figure D-1, at the end of this section) or be treated with anti-slip type paint or treatment.

(f) Such rungs or steps installed in the walls of risers or conical top sections of manholes shall be uniformly spaced from 12 inches to 16 1/2 inches apart and be a minimum of 10 inches in length.

WAC 296-24-81005 (Cont.)

(i) The manhole rungs or steps shall have a minimum of 4 inches of clearance between the rung or step and the wall.

(ii) The manhole rung or step shall be capable of sustaining a single concentrated load of 300 pounds.

(2) Side rails. Side rails which might be used as a climbing aid shall be of such cross sections as to afford adequate gripping surface without sharp edges, splinters, or burrs.

(3) Fastenings. Fastenings shall be an integral part of fixed ladder design.

(4) Splices. All splices made by whatever means shall meet design requirements as noted in WAC 296-24-81003(1). All splices and connections shall have smooth transition with original members and with no sharp or extensive projections.

(a) When fixed ladders are spliced the splice plates shall be the same depth as side rails.

(b) The length of the splice plates shall be 4 times the depth of the side rail. They shall be of metal not less than one-fourth of an inch in thickness and chamfered on all exposed edges.

(c) Splice plates shall be secured by bolts or rivets with the heads countersunk or of the button type.

(d) The heads shall be on the outside of the rail.

(e) The bolts or rivets shall be not less than one-half inch nor more than five-eighths inch in diameter.

(f) The bolt ends shall be chamfered with only the chamfered end extending beyond the nut.

(g) Both ends of the rivet shall be button shape.

(h) Washers shall be placed under the nuts and rivet ends on wood side rails.

(i) There shall be a minimum of 3 bolts or rivets on each side of the joint for metal side rails and a minimum of 4 bolts or rivets for wood side rails.

(j) Bolts and rivets in both metal and wood side rails shall be staggered in position.

(5) Electrolytic action. Adequate means shall be employed to protect disimilar metals from electrolytic action when such metals are joined.

(6) Welding. All welding shall be in accordance with the “Code for Welding in Building Construction” (AWS D1.0-1966).

(7) Protection from deterioration.

(a) Metal ladders and appurtenances shall be painted or otherwise treated to resist corrosion and rusting when location demands. Ladders formed by individual metal rungs imbedded in concrete, which serve as access to pits and to other areas under floors, are frequently located in an atmosphere that causes corrosion and rusting. To increase rung life in such atmosphere, individual metal rungs shall have a minimum diameter of 1 inch or shall be painted or otherwise treated to resist corrosion and rusting.

WAC 296-24-81005 (Cont.)

(b) Wood ladders, when used under conditions where decay may occur, shall be treated with a nonirritating preservative, and the details shall be such as to prevent or minimize the accumulation of water on wood parts.

(c) When different types of materials are used in the construction of a ladder, the materials used shall be so treated as to have no deleterious effect one upon the other.

[Statutory Authority: Chapter 49.17 RCW. 90-03-029 (Order 89-20), § 296-24-81005, filed 1/11/90, effective 2/26/90; Order 73-5, § 296-24-81005, filed 5/9/73 and Order 73-4, § 296-24-81005, filed 5/7/73.]

WAC 296-24-81007 Clearance.

(1) Climbing side. On fixed ladders, the perpendicular distance from the centerline of the rungs to the nearest permanent object on the climbing side of the ladder shall be 36 inches for a pitch of 76 degrees, and 30 inches for a pitch of 90 degrees (Fig. D-2 of this section), with minimum clearances for intermediate pitches varying between these 2 limits in proportion to the slope, except as provided in (3) and (5) of this section.

(2) Ladders without cages or wells. A clear width of at least 15 inches shall be provided each way from the centerline of the ladder in the climbing space, except when cages or wells are necessary.

(3) Ladders with cages or baskets. Ladders equipped with cage or basket are excepted from the provisions of (1) and (2) of this section, but shall conform to the provisions of WAC 296-24-81009 (1)(e). Fixed ladders in smooth-walled wells are excepted from the provisions of (1) of this section, but shall conform to the provisions of WAC 296-24-81009 (1)(f).

(4) Clearance in back of ladder. The distance from the centerline of rungs, cleats, or steps to the nearest permanent object in back of the ladder shall be not less than 7 inches, except that when unavoidable obstructions are encountered, minimum clearances as shown in Figure D-3 shall be provided.

(5) Clearance in back of grab bar. The distance from the centerline of the grab bar to the nearest permanent object in back of the grab bars shall be not less than 4 inches. Grab bars shall not protrude on the climbing side beyond the rungs of the ladder which they serve.

(6) Step-across distance. The step-across distance from the nearest edge of ladder to the nearest edge of equipment or structure shall be not more than 12 inches, or less than 2 1/2 inches (Fig. D-4).

(7) Hatch cover. Counterweighted hatch covers shall open a minimum of 60 degrees from the horizontal. The distance from the centerline of rungs or cleats to the edge of the hatch opening on the climbing side shall be not less than 24 inches for offset wells or 30 inches for straight wells. There shall be no protruding potential hazards within 24 inches of the centerline of rungs or cleats; any such hazards within 30 inches of the centerline of the rungs or cleats shall be fitted with deflector plates placed at an angle of 60 degrees from the horizontal as indicated in Figure D-5.The relationship of a fixed ladder to an acceptable counterweighted hatch cover is illustrated in Figure D-6.

[Order 73-5, § 296-24-81007, filed 5/9/73 and Order 73-4, § 296-24-81007, filed 5/7/73.]

WAC 296-24-81009 Special requirements.

(1) Cages or wells.

(a) Cages or wells (except on chimney ladders) shall be built, as shown on the applicable drawings, covered in detail in Figures D-7, D-8, and D-9, or of equivalent construction.

WAC 296-24-81009 (Cont.)

(b) Cages or wells (except as provided in (5) of this section) conforming to the dimensions shown in Figures D-7, D-8, and D-9 shall be provided on ladders of more than 20 feet to a maximum unbroken length of 30 feet.

(c) Cages shall extend a minimum of 42 inches above the top of landing, unless other acceptable protection is provided.

(d) Cages shall extend down the ladder to a point not less than 7 feet nor more than 8 feet above the base of the ladder, with bottom flared not less than 4 inches, or portion of cage opposite ladder shall be carried to the base.

(e) Cages shall not extend less than 27 nor more than 28 inches from the centerline of the rungs of the ladder. Cage shall not be less than 27 inches in width. The inside shall be clear of projections. Vertical bars shall be located at a maximum spacing of 40 degrees around the circumference of the cage; this will give a maximum spacing of approximately 9 1/2 inches, center to center.

(f) Ladder wells shall have a clear width of at least 15 inches measured each way from the centerline of the ladder. Smooth-walled wells shall be a minimum of 27 inches from the centerline of rungs to the well wall on the climbing side of the ladder. Where other obstructions on the climbing side of the ladder exist, there shall be a minimum of 30 inches from the centerline of the rungs.

(2) Landing platforms. When ladders are used to ascend to heights exceeding 20 feet (except on chimneys), landing platforms shall be provided for each 30 feet of height or fraction thereof, except that, where no cage, well, or ladder safety device is provided, landing platforms shall be provided for each 20 feet of height or fraction thereof. Each ladder section shall be offset from adjacent sections. Where installation conditions (even for a short, unbroken length) require that adjacent sections be offset, landing platforms shall be provided at each offset.

(a) Where a person has to step a distance greater than 12 inches from the centerline of the rung of a ladder to the nearest edge of structure or equipment, a landing platform shall be provided. The minimum step-across distance shall be 2 1/2 inches.

(b) All landing platforms shall be equipped with standard railings and toeboards, so arranged as to give safe access to the ladder. Platforms shall be not less than 24 inches in width and 30 inches in length.

(c) One rung of any section of ladder shall be located at the level of the landing laterally served by the ladder. Where access to the landing is through the ladder, the same rung spacing as used on the ladder shall be used from the landing platform to the first rung below the landing.

(3) Ladder extensions. The side rails of through or side-step ladder extensions shall extend 3 1/2 feet above parapets and landings. For through ladder extensions, the rungs shall be omitted from the extension and shall have not less than 18 nor more than 24 inches clearance between rails. For side-step or offset fixed ladder sections, at landings, the side rails and rungs shall be carried to the next regular rung beyond or above the 3 1/2 feet minimum (Fig. D-10).

(4) Grab bars. Grab bars shall be spaced by a continuation of the rung spacing when they are located in the horizontal position. Vertical grab bars shall have the same spacing as the ladder side rails. Grab-bar diameters shall be the equivalent of the round-rung diameters.

WAC 296-24-81009 (Cont.)

(5) Ladder safety devices. Ladder safety devices may be used on tower, water tank, and chimney ladders over 20 feet in unbroken length in lieu of cage protection. No landing platform is required in these cases. All ladder safety devices such as those that incorporate lifebelts, friction brakes, and sliding attachments shall meet the design requirements of the ladders which they serve.

[Statutory Authority: Chapter 49.17 RCW. 94-15-096 (Order 94-07), § 296-24-81009, filed 7/20/94, effective 9/20/94; Order 73-5, § 296-24-81009, filed 5/9/73 and Order 73-4, § 296-24-81009, filed 5/7/73.]

WAC 296-24-81011 Pitch. Preferred pitch.

(1) The preferred pitch of fixed ladders shall be considered to come in the range of 75 degrees and 90 degrees with the horizontal (Fig. D-11).

(2) Substandard pitch. Fixed ladders shall be considered as substandard if they are installed within the substandard pitch range of 60 and 75 degrees with the horizontal. Substandard fixed ladders are permitted only where it's found necessary to meet conditions of installation. This substandard pitch range shall be considered as a critical range to be avoided, if possible.

(3) Scope of coverage in this section. This section covers only fixed ladders within the pitch range of 60 degrees and 90 degrees with the horizontal.

(4) Pitch greater than 90 degrees. Ladders having a pitch in excess of 90 degrees with the horizontal are prohibited.

[Statutory Authority: RCW 49.17.040, 49.17.050, 49.17.240, chapters 43.22 and 42.30 RCW. 80-17-015 (Order 80-21), § 296-24-81011, filed 11/13/80; Order 73-5, § 296-24-81011, filed 5/9/73 and Order 73-4, § 296-24-81011, filed 5/7/73.]

WAC 296-24-81013 Maintenance and use.

(1) All ladders shall be maintained in a safe condition. All ladders shall be inspected regularly, with the intervals between inspections being determined by use and exposure.

Note: For illustrations, see Figs. D-1 through D-11.

WAC 296-24-81013 (Cont.)

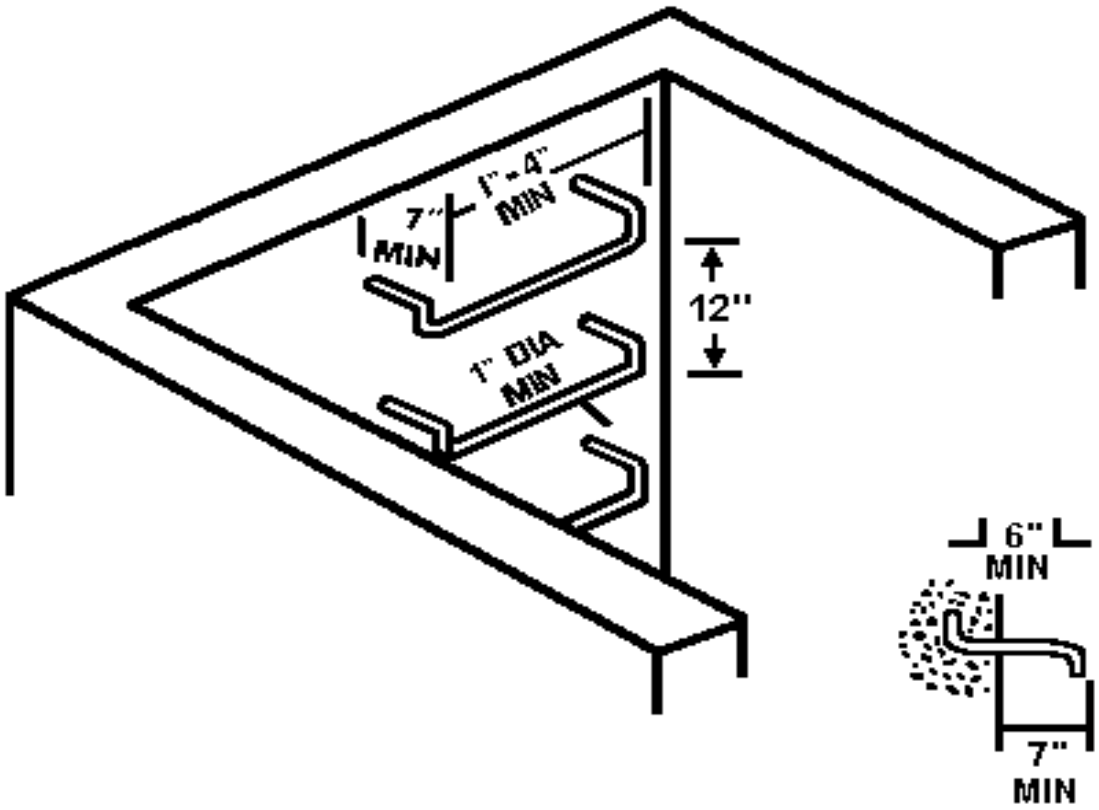
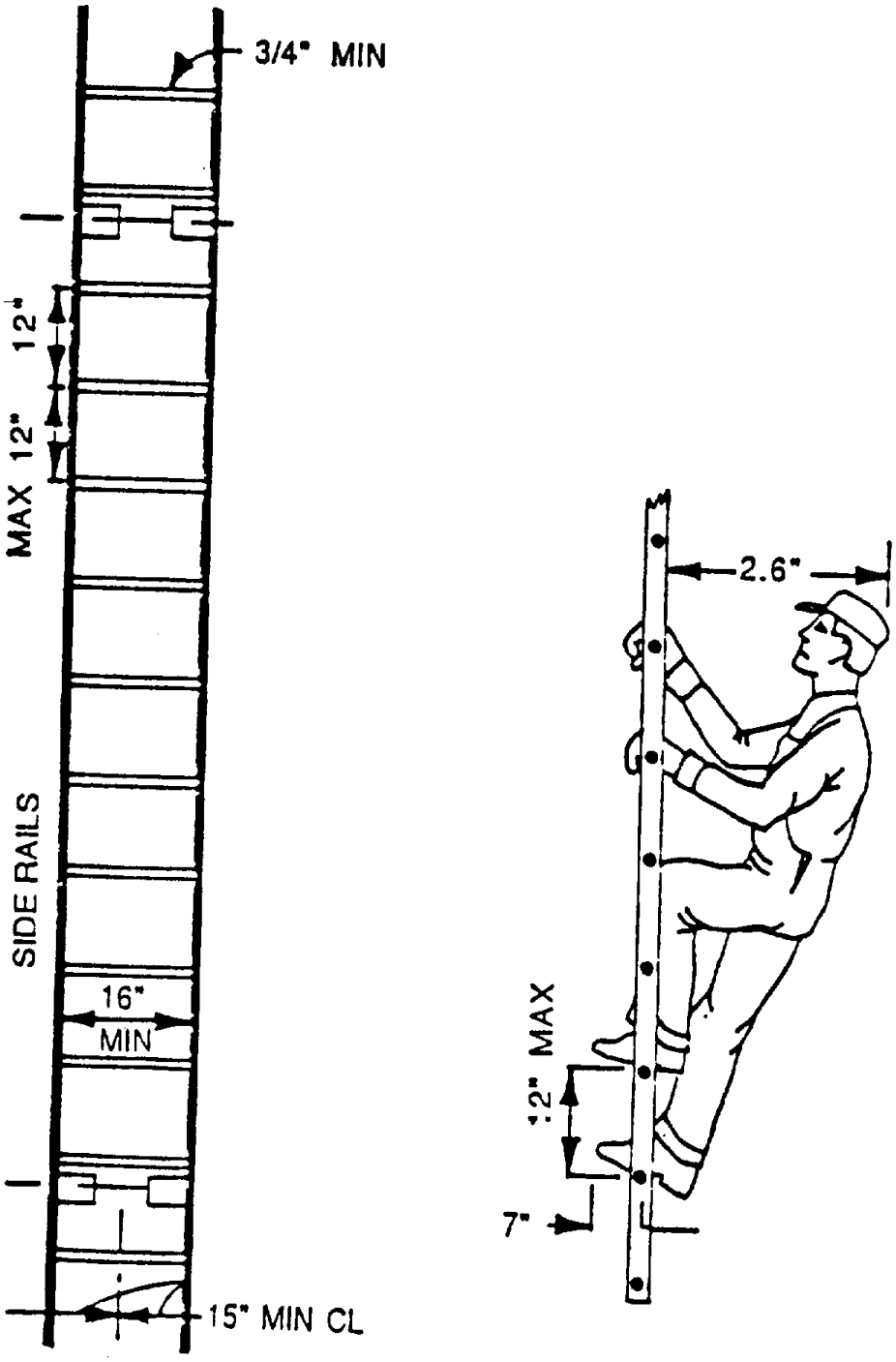


Figure D-1
Suggested design for rungs on
individual-rung ladders

WAC 296-24-81013 (Cont.)



RAIL LADDER WITH BAR STEEL RAILS AND ROUND STEEL RUNGS

Figure D-2
Minimum Ladder Clearances

WAC 296-24-81013 (Cont.)

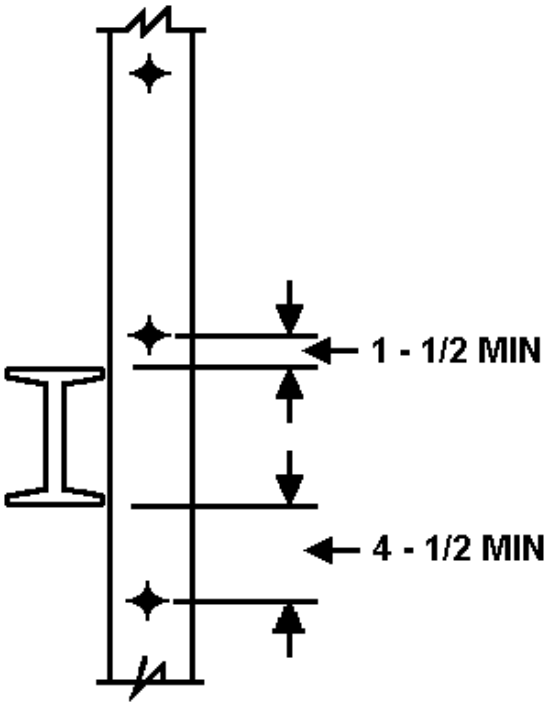


Figure D-3
Clearance for Unavoidable Obstruction at Rear of Fixed Ladder

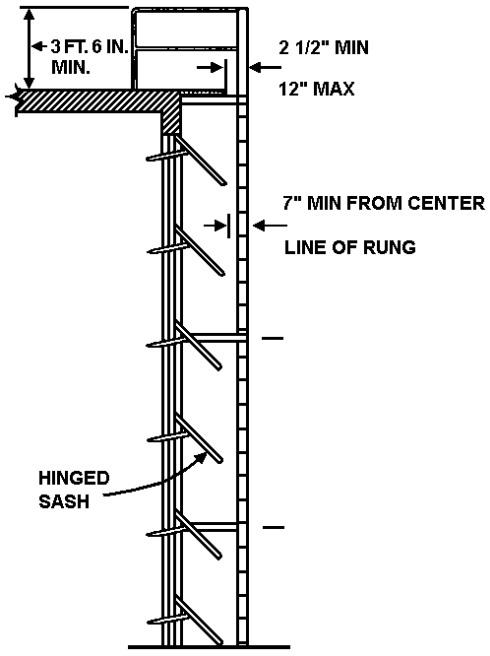


Figure D-4
Ladder Far from Wall

WAC 296-24-81013 (Cont.)

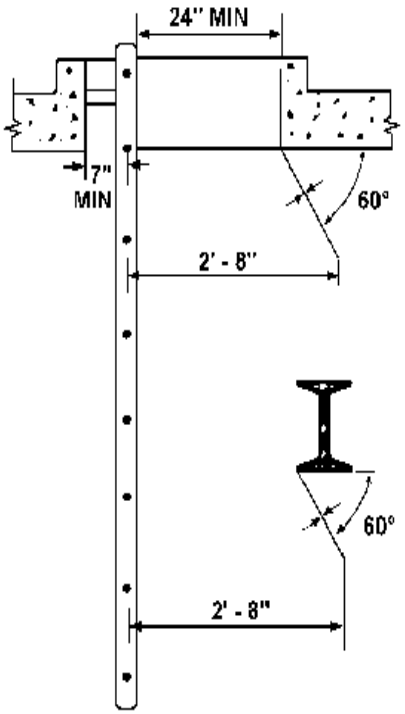


Figure D-5
Deflector plates for Head Hazards

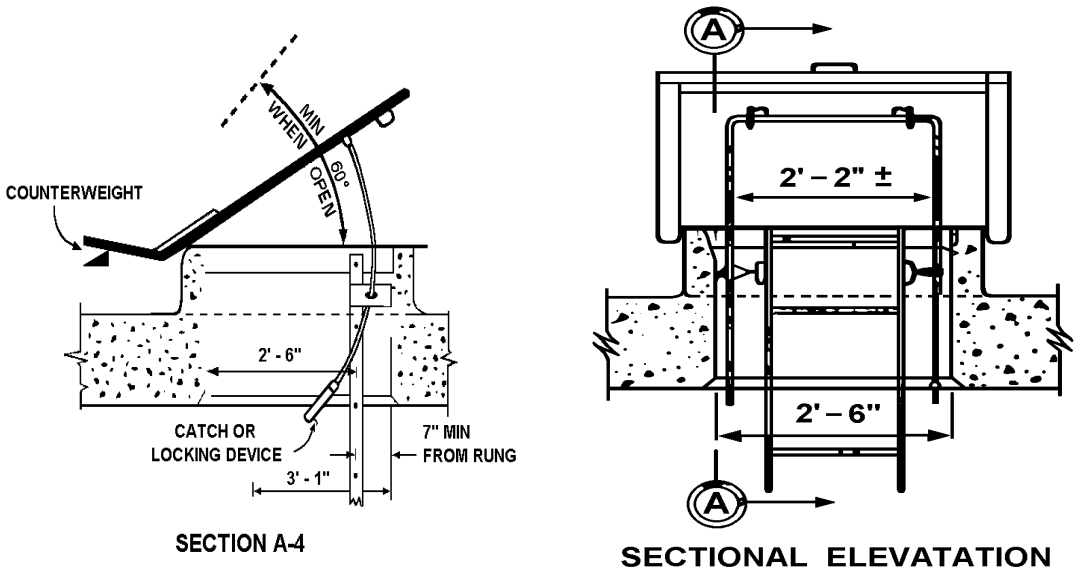


Figure D-6
Relationship of Fixed Ladder to a Safe Access Hatch

WAC 296-24-81013 (Cont.)

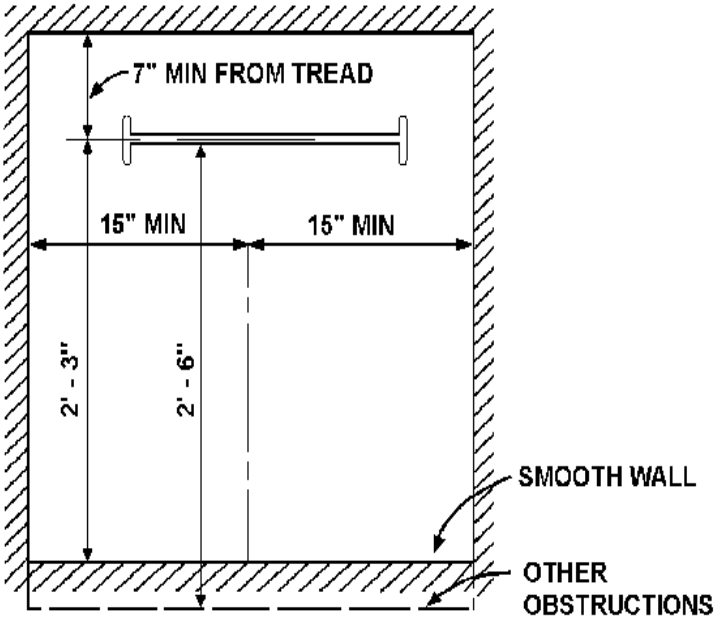


Figure D-7
Clearance Diagram for Fixed Ladder in Well

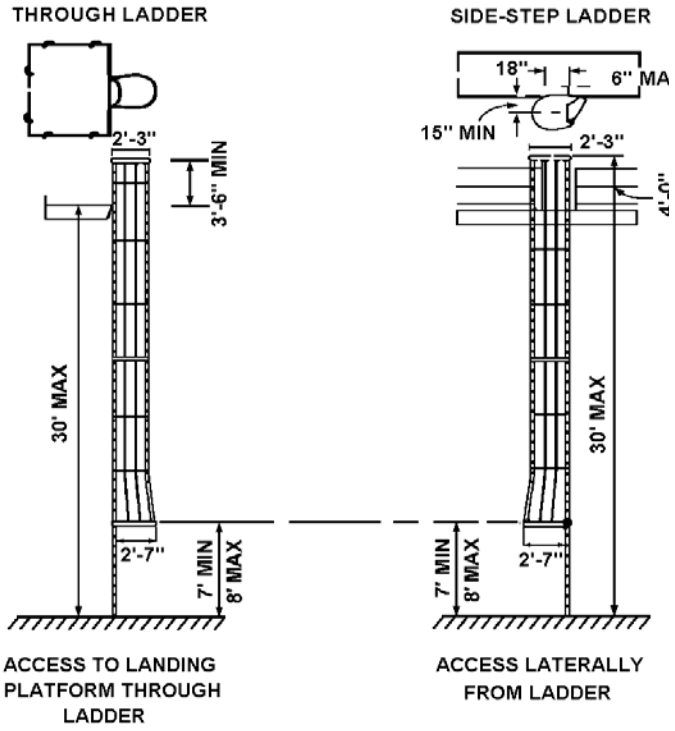


Figure D-8 (Part 1)

WAC 296-24-81013 (Cont.)

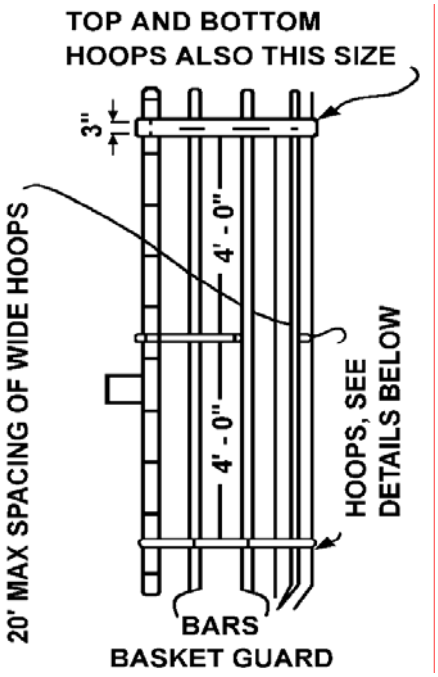
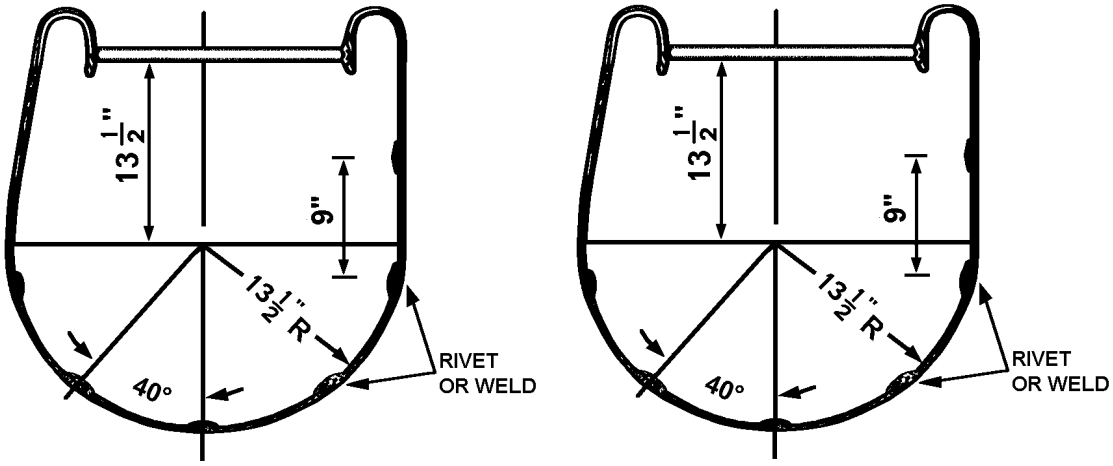


Figure D-8 (Part 2)
Clearance for Unavoidable Obstruction at Rear of Fixed Ladder



BASKET GUARD HOOP
ANGLE IRON LADDER

BASKET GUARD HOOP
BAR LADDER

Figure D-8 (Part 3)
Cages for Ladders more than 20 Feet High

WAC 296-24-81013 (Cont.)

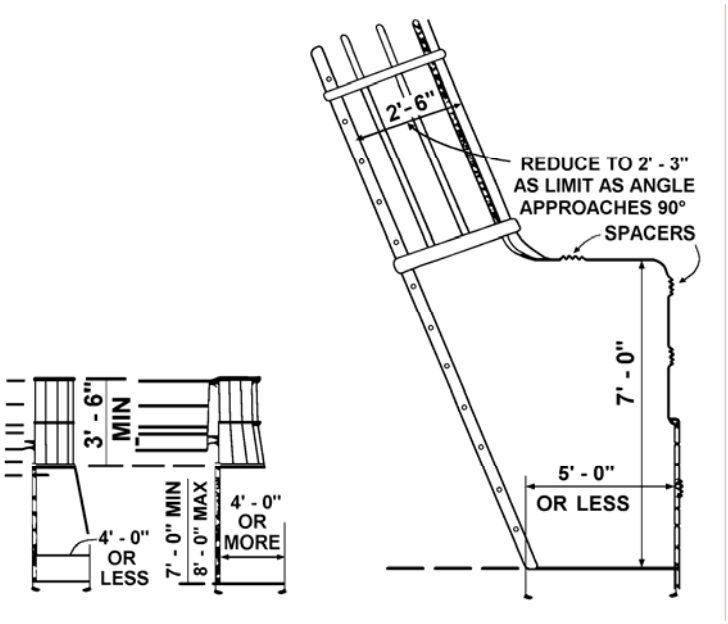


Figure D-9
Cages--Special Applications

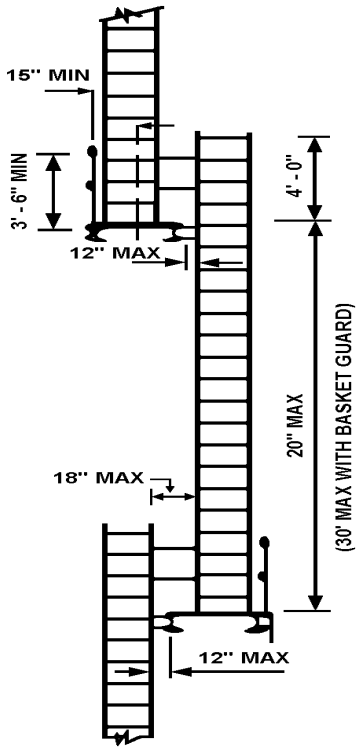


Figure D-10
Offset Fixed Ladder Sections

WAC 296-24-81013 (Cont.)

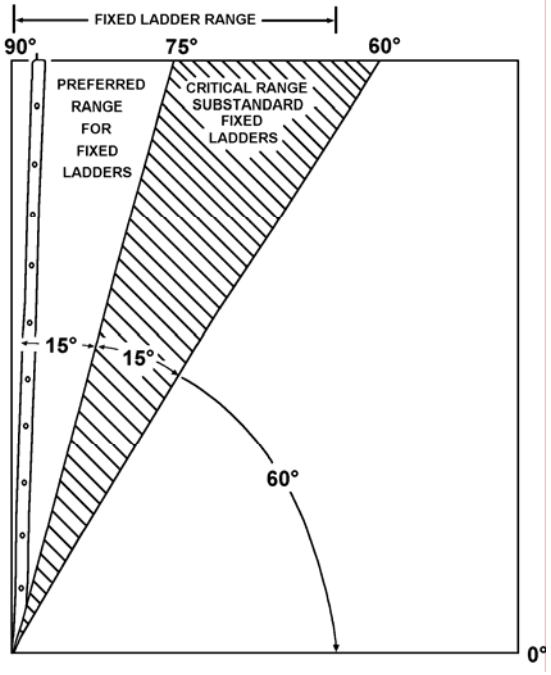


Figure D-11
Pitch of Fixed Ladders

(2) When ascending or descending, the climber must face the ladder.

(3) Workers shall not ascend or descend ladders while carrying tools or materials which will interfere with the free use of both hands.

[Statutory Authority: Chapter 49.17 RCW. 94-15-096 (Order 94-07), § 296-24-81013, filed 7/20/94, effective 9/20/94; Order 76-6, § 296-24-81013, filed 3/1/76; Order 73-5, § 296-24-81013, filed 5/9/73 and Order 73-4, § 296-24-81013, filed 5/7/73.]

WAC 296-24-855 Other working surfaces.

[Order 73-5, § 296-24-855, filed 5/9/73 and Order 73-4, § 296-24-855, filed 5/7/73.]

WAC 296-24-85501 Dockboards (bridge plates).

(1) Portable and powered dockboards shall be strong enough to carry the load imposed on them.

(2) Portable dockboards shall be secured in position, either by being anchored or equipped with devices which will prevent their slipping.

(3) Powered dockboards shall be designed and constructed in accordance with Commercial Standard CS202-56 (1961) “Industrial Lifts and Hinged Loading Ramps” published by the U.S. Department of Commerce.

(4) Handholds, or other effective means, shall be provided on portable dockboards to permit safe handling.

(5) Positive protection shall be provided to prevent railroad cars from being moved while dockboards or bridge plates are in position.

[Order 73-5, § 296-24-85501, filed 5/9/73 and Order 73-4, § 296-24-85501, filed 5/7/73.]

WAC 296-24-85503 Forging machine area.

(1) Machines shall be so located as to give (a) enough clearance between machines so that the movement of one operator won't interfere with the work of another, (b) ample room for cleaning machines and handling the work, including material and scrap. The arrangement of machines shall be such that operators won't stand in aisles.

(2) Aisles shall be provided of sufficient width to permit the free movement of employees bringing and removing material. This aisle space is to be independent of working and storage space and should be defined by marking.

(3) Wood platforms used on the floor in front of machines shall be substantially constructed with nonslip surfaces.

[Statutory Authority: RCW 49.17.040, 49.17.150, and 49.17.240. 79-08-115 (Order 79-9), § 296-24-85503, filed 7/31/79; Order 73-5, § 296-24-85503, filed 5/9/73 and Order 73-4, § 296-24-85503, filed 5/7/73.]

WAC 296-24-85505 Veneer machinery.

(1) Sides of steam vats shall extend to a height of not less than 36 inches above the floor, working platform, or ground.

(2) Large steam vats divided into sections shall be provided with substantial walkways between sections. Each walkway shall be provided with a standard handrail on each exposed side. These handrails may be removable, if necessary.

(3) Covers shall be removed only from that portion of steaming vats on which people are working and a portable railing shall be placed at this point to protect the operators.

(4) Workers shall not ride or step on logs in steam vats.

[Statutory Authority: Chapter 49.17 RCW. 94-15-096 (Order 94-07), § 296-24-85505, filed 7/20/94, effective 9/20/94; Order 73-5, § 296-24-85505, filed 5/9/73 and Order 73-4, § 296-24-85505, filed 5/7/73.]